UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/680,073 | 10/06/2003 | Kathryn R. Nightingale | 5405-293 | 9938 |

20792 7590 05/19/2006

MYERS BIGEL SIBLEY & SAJOVEC
PO BOX 37428
RALEIGH, NC 27627

| EXAMINER | |
|---|---|
| JAWORSKI, FRANCIS J | |
| **ART UNIT** | **PAPER NUMBER** |
| 3768 | |

DATE MAILED: 05/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|---|---|---|
| ***Office Action Summary*** | **Application No.**<br>10/680,073 | **Applicant(s)**<br>NIGHTINGALE ET AL. |
| | **Examiner**<br>Jaworski Francis J. | **Art Unit**<br>3768 |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *3-28-05 (IDS)*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1 - 88* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 88* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *3-28-05*.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> **The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

Claims 1, 3 – 27, 54, 56 – 57, 59 – 63, 66 – 68, 70 - 74 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1) The terminology " plurality/set of tracking signals " is vague in the art context since on the one hand it may reasonably refer to methods for spawning additional receive data sets such as by parallel beamformer processing using broad beam or defocused ensonation and/or by interpolation practiced on scan lines obtained by conventional focused transmission, either of which results in the production of multiple A-lines from the originally delivered tracking pulse (see specification page 12 lines 23 – 31 and refer to Daigle et al US5940123 cols. 1 through col. 6 line 19 as representing how the artisan would understand these processes ), 'signals' meaning received ultrasound signals or electrical signals arising after acousto-electrical transducing for purposes of this discussion, yet on the other hand the specification would apparently admit of circumstances in which no multiplicative effect such as by parallel processing for received *scanlines* is necessarily occurring (see for example page 6, top portion, and bearing in mind that this statement set occurs under a receive mode parallel processing heading per page 5 line 30), whereupon the interpretation for this terminology may

collapse to an interpretation of (using claim 1 final two lines for example) ' -- receiving a plurality of tracking signals (derived) from differing depth locations along the scanline of the returning echo of the tracking pulse –' i.e. the activity of specification page 12 lines 32 –34, under which latter interpretation the claim phraseology effectively reduces to the production of a single return A-scanline for a tracking pulse or the unit step during for example ARFI (defined spec p. 8 top portion) or other type (e.g. non-acoustic solenoid driver-based) pushing processes displacing the transducer array during remote palpation imaging scans. Since as an additional confoundment to interpretation, conventional A-lines can be processed in parallel by buffering after their reception (as opposed to being initially received in parallel) and may involve generation of additional data signals with respect to original data signals (such as in the fast calculation technique of Pesavento et al (US6520913) col. 4 lines 15 – 27, col. 6 lines 25 – 30 and claim 4, or the sub-pitch interpolation of Ophir et al (US5474070) cols. 13 – 14 bridging para, claim 1 for example would be confusing to the artisan as to scope.

Dependent claims which do not specify e.g. parallel (beamformed) processing including claims directed to signals derived from multiple sums of differently focused delayed signals interpreted as resulting from phased array beamformation along but single scanlines inherit this deficiency.

2) There is no indication e.g. in claim 1 that the pushing pulse necessarily produces a degree of displacement which rises to the level of discernible for target medium characterizing purposes, or that the tracking pulse delivery and receiving in fact ever uses this displacement. For example, Ophir et al col. 3 lines 6 – 58 would

indicate that B-mode, Doppler velocity and M-mode may all give compressibility displacement information from transmit/receive scanline sets (which the Examiner is characterizing respectively 'tracking pulses/tracking signals' for purposes of immediate discussion) albeit that the displacement caused by the investigative ensonations in these cases is itself negligible and goes unmeasured.. On the other hand in the case of sonoelasticity displacement induction techniques discussed therein and in the case of acoustic radiation force (imaging) as per the Walker et al article (J. Acoustic Soc. 105, of record) techniques by which the acoustic radiation may reach discernible threshold are entertained. Hence the vagueness issue relates to which of this paragraph's techniques are embraced by the claims' language.

## *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> **Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.**

Claims 1 – 2, 10 - 13, 23 – 25, 27 –28, 35- 44, 47, 54 –55, 64, 66 – 67, 75 and 81 - 82 are rejected under 35 U.S.C. 101.

Under current PTO guidelines, evaluation of presented claims under 35 USC 101 which include abstractions require that the Examiner firstly determine whether the claimed invention (1) transforms an article or physical object to a different state or thing. Since applicants' invention is directed to diagnostic methods and structure and program products, such transformation of an article or physical object is not present, and therefore the claimed invention must be further evaluated as to (2) whether a 'useful, concrete and tangible result' is produced.

Since the reception of signals irrespective of the application specificity involved is per se an abstract result, claims 1 –2, 10 - 13, 23 – 25 and 27 are deficient regarding recitation of a statutory result.

Claims 3 – 9, 14 – 22, 26, 29-34 variously result in the detection oftarget positions, initial or displaced positions , or regions of greater/lesser stiffnesses as practical results flowing from the region displacement steps or the production of an image or a displacement map and therefore avoid rejection.

Claims 28, 35 - 44 while commencing with a detection have only the comparison of signals as an end result and therefore fails muster, irrespective of the fact that there is a tangible context for example of arterial wall/cardiac tissue detection which feed towards the signal comparison result.

Claims 45 and 46 pass muster regarding map production as a claimed result.

Claims 47 groups as deficient as in the claim 28 case.

Claim 48 passes as in the case of claim 3, and so dependent claims 49 –53 pass as well.

Claims 54 – 55 group as deficient irrespective of the code being embodied in an article since what is embodied are instructions for receiving a signal or an incomplete abstraction.

Claims 56 - 63 produces a tangible, detected displacement result or depend from such claiming.

Claim 64 groups with claim 28.

Claims 65 – 67 fail muster since the production of a comparison result by a program results in an abstract fruition and since an intended use recitation of detecting displaced position unlike the method case bears no weight until structure is recited as configured/adapted to perform such.

Claims 68 – 74 pass muster under the reverse of the same reasoning as presented immediately above.

Claim 75 and 81 fail according to the claim 28/64 reasoning.

Claims 76 – 80 pass under the claim 68 – 74 reasoning.

Claim 82 fails for the claim 75 reasoning.

Claims 83 – 88 pass muster for the reason provided re claims 68-74 supra.

## ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3 – 4, 6 – 27, 66 – 68, 70 - 74 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims variously of U.S. Patent No.6951544 and 6371912. Although the conflicting claims are not identical, they are not patentably distinct from each other because the patents variously claim structure and method for delivering pushing and tracking pulses with recovery of detected positions likenable to 'tracking signals' under the broader interpretation provided supra, and with further claimed features including delivery of pushing pulses at multiple acoustic radiation energy levels, .72 W/cm2 at the first level and 10 – 1000 W/cm2 at the second level, and with one or two dimensional arrays, and with a 1:1 ratio of pushing and tracking, and for relating stiffness inversely to displacement for tumor/breast/hardened blood vessel/muscle detection, and for producing two or three-dimensional images of spatial points, and with precompression, and with repetition of cycles across a plurality of displaced positions for combination into the aforementioned image, and with combination of plural displacement maps, .

Claims 54, 56 – 57, 59 – 63 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims variously of the aforementioned U.S. Patent Nos 6371912 and 6951544 in view of Konofagou et al (US6270459) since whereas the former do not claim a computer product, it would have been obvious in view of the latter to utilize software to perform elastographic - related computations in view of their complicated nature, see cols. 15 – 16 bridging, the rejection reasoning above otherwise applying.

Claims 1 - 27, 54 – 63, 66 – 68 and 70 – 74 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims variously of U.S. Patent Nos. 6371912 and 6951544 in view of claims of Trahey et al (US 6764448) either alone or further in view of Konofagou et al (US6270459), in turn alone or further in view of Bonnefous (US6561981)..

The former are applied as above, however for purposes of this argument the claims are construed to more narrowly refer to some parallel processing of tracking signals, whereupon under a first line of argument.the claimed Trahey et al shear wave invention, specifically claims 6, 19 and 31 considered together with claim 20 and various claimed references to tracking is in and of itself suggestive of remote palpation (pushing) when referenced to the other patent's claims. If on the other hand this interpretation be considered impermissible insofar as the Examiner is impermissibly influenced by the unclaimed disclosure of ARFI-compatability (patent col. 4 lines 17 – 26) , then it would have been obvious in view of Konofagou et al, displacement step Fig. 1C to practice a pushing step in association with transverse tissue mechanical property measurements i.e the context of the '448 patent's claims. Konofagou et al is to be considered part of arguments regarding program code as set forth above. If additionally Konofagou et al is considered to be a transverse measurement but of the transverse component of axial push compression and therefore technically not to the measurement of shear, then it would have been nonetheless further obvious in view of Bonnefous element 2 and its description page 3 bottom to apply a remote palpation shear wave as a pushing source when receive-tracking such as in Trahey et al, and accordingly all claim sets apart from the cardiac feature sets are rejected on this basis.

Claims 47 – 53, 65, and 82 – 88 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims variously of U.S. Patent Nos. 6371912 or 6951544 alone or further in view of 6764448, alone or futher in view of Konofagou et al (in claims where program code is invoked, vide supra) further in view of Cespedes et al (US 6165128). The former are applied as in the alternative ODP arguments supra. Since both '912 and '544 patents include claiming of applicability to the hardened blood vessel, Cespedes et al represents, when the in vitro case is considered, i.e. when an arterial excised specimen is placed in a testing tank and an IVUS balloon push pressure is applied (col. 5 lines 22 – 58), an invitation to analyze hardened artery sections by conventional ultrasound palpation techniques, including range-gated analyses comparisons of first and second spatial points of the vessel wall (Col. 6 lines 7 – 23), since the balloon modality of pushing is clearly only to set up for an IVUS-catheter-based in vivo implementation.

In other words, this argument extends to all vessel wall palpation (pushing) claims not inferential of an in-vivo state as per claiming of relation to cardiac cycling, and holds for in-vitro excised artery (there being no limitations in the cited claims barring an excision interpretation) .

Claims 28 – 46, 64 and 75 - 81 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims variously of U.S. Patent Nos. 6371912 and 6951544 alone or further in view of Patent No. 6764448, further in view of Korte et al (Phys. Med. Biol. 45 (2000) 1465 – 1475) and Panescu et al (US5848969). The above argument holds in general form, with explanation that the Cespedes et al work of the immediately preceding rejection incorporates into page 1468 Section 2.3.4. and thereafter of Korte et al, and with further explanation that in the in-vivo case the elastograms under push pressure applications are advantageously obtained at a plurality of cardiac cycle points, see Korte et al page 1471, final para. Whereas Korte et al is per se silent as to how an acoustic force radiation push or other push mediated by the transducers as prime mover be applied, it would have been obvious in view of Panescu et al col. 15 line 15 – col. 16 line 15 to mount transducer arrays 210 within an intravascular balloon since this brings the array into near contact apposition with the artery wall which is advantageous in light of the high tracking frequencies needed for resolution versus attenuation of the desirable RF returns.

[Note for understanding's sake that Cespedes et al more clearly discusses first and second spatial points associated with vascular layers; Korte et al bears specific statement regarding using points in the heart cycle during in-vivo study hence the rejection duality albeit excised artery in vitro elastographic study and in vivo IVUS-based study are addressed in both.]

## *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 28, 47, 64 – 65, 75 and 82 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamazaki et al (US5673700).

Yamazaki et al being a lengthy document, the Examiner is excerpting to point out to applicants certain rejection implications of these claims' scope: In Yamazaki et al the Doppler passband ordinarily emphasizing bloodflow is switched (col. 9 lines 5 – 47) soas to emphasize cardiac muscle velocity and related parameters, or in fact blood vessel wall parameters (col. 12 lines 30 – 34, col. 38 bottom) for the specific purpose of studying the kinetics of the heart during stress echocardiologic testing. Since myocardial thickness (endocardial to epicardial boundary, col. 42 lines 6 - 30) comparisons may be included in the assessement of functional cardiac degradation regarding mechanical contraction properties (col. 14 lines 62 – 64) and in accordance with heartbeat synchronization over systolic/diastolic intervals using a resident computer program product (col. 22 lines 32 – 44).

[Alternatively stated, the Examiner is interpreting 'mechanical property' as broadly encompassing the kinetic properties of mechanics of heart tissue contraction.]

Claims 28, 47, 64 – 65, 75 and 82 are rejected under 35 U.S.C. 102(b,e respectively) as being anticipated by Bonnefous (US5411028) or Varghese et al (US6749571) which respectively pertain to arterial wall boundary layer/cardiac chamber boundary detection using ECG synchronization salients for comparisons associated with systole/diastole or layer behaviors.

[Alternately stated, the examiner is more narrowly construing mechanical properties along elastographic tissue structure characterization lines as per applicantst' specification.]

## *Claim Rejections - 35 USC § 103*

[Note: The Examiner is presuming a filing date of October 6, 2003 for the subject matter associated with plural signals or sets of signals per pushing pulse, under the narrower parallel processing/interpolation construal. The Examiner is also assuming an October 6, 2003 filing date for the blood vessel/cardiac tissue analysis vis a vis cardiac timing and vessel wall layer relationships insofar as the earlier patent disclosures discuss the vessel characterization application in more general terms.]

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 – 27, 54 – 63 and 66 – 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over 1) Konofagou et al (US6270459) alone or 2) further in view of Walker, of record, alone or 3) in either case further in collective view of Torp et al(US6352507), Lysansky et al(US6221020) and Geiman et al (Phys. Med. Biol. 45 (2000)).

Under the former interpretation, Konofagou et al in fig. 2 and the attendant discussion col. 11 line 28 - col. 12 line 31 pertains to generation of plural additional A-line tracking signals by interpolation within the receive section of the system which suffices to meet the plurality/set of tracking signals limitation, and the displacing step of Fig. 1C is 'pushing' using the array as prime mover.

Under the second interpretation the remote palpation is in fact an acoustic radiation force emitted from the array proper, as a substitution into Konofagou et al of the Walker teaching, with other claims arguments otherwise applying. In effect, the former is a remote palpation method and system and program code precedent serving as a skeleton onto which to incorporate the newer technology teaching.

Under the third and last interpretation the Examiner is grouping all suggestions applying parallel processing to push compression elastography en bloc with argument that the whole at some point exceeds the sum of the parts (see also patentability portion item 5), meaning that the multiplicity of such an acknowledgment grouping in the prior art and/or in the public domain militates towards obviousness.

Claims 28 – 53, 64 – 65 and 75 – 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konofagou et al (incorporating Ophir et al US547407) alone or further in view of Walker, alone or further in view of Torp et al/Lysansky et al/Geiman et al collectively, further in view of Korte et al and Cespedes alone or further in view of Panescu et al.

Effectively the Examiner is repeating the above-constructed arguments with respect to obvious-type double-patenting for palpation-based parallel processing or for vascular studies en-bloc. That is, Konofagou et al represents the prior art compression/displacement elastographic measurement system practiced exterior to the body with the incorporated Ophir et al noting the duality of external compression application and internal compression generation in the vasculature, save that convenient internal reference for the compression force vector was lacking. Walker established utility for acoustic radiation force as a push mechanism advance over mechanical compression to be provided by the ultrasound array itself for a variety of quasi-static tissue types i.e. liver/breast/vitreous.

Since there was a collective suggestion to perform parallel processing in association with compression/displacement elastography as per T/L/G, and in vitro suggestion to treat vascular tissue like any other tissue for mechanical property evaluation (Korte and Cespedes et al), the argument is then made that vascular external study using radiation force-induced (ultrasound array pushing) elastography, and in association with parallel processing, would have been a known variant in consideration of this art. Since these latter also suggested in vivo vascular compression elastography using dynamically varying loading levels of an IVUS balloon (thereby establishing directionality of compression and answering the above-stated need of Ophir et al) and since heart synchronization was known in conjunction with in-vivo elastography and it was known to bring a balloon-mounted ultrasound array into tissue apposition for imaging (Panescu et al) then under the narrow interpretation of the claims specifics it would have been obvious to extend acoustic force radiation pushing by transducer array intravascularly and in association with layer-based spatial point and heart cycle triggered measurements.

## Patentability Assessment

The arguments against patentability for the current claims' wording are re-stated in summary:

1) At least some claims lack clarity as to whether parallel processing is being claimed in the language 'plurality of signals/signal sets' and if not, what in addition is claimed by the language, against a prior art context in which plural data is acquired per A-scan line, optionally with additional interpolative data electronically produced. Additionally, it is unclear that the push displacement is discernible and the object of measurement.

2) At least some claims are left hanging with regard to progressing past signal or other abstract intermediate stages towards a 'useful, concrete and tangible result' required by the 35 USC 101 statute.

3) Predatory upon a broad interpretation relying on the above, both parent patents '912 and '544 are applied under obvious double patenting rejections with arguments that the rejected claims do not distinguish over the pushing technique invention in facets of application apart from parallel processing.

4) Apart from such a broad, predatory interpretation, the tertiary patent Trahey et al is applied for its claimed parallel processing content against the relevant application claims in two variants – under the premise that the patent claims of themselves provide sufficient basis for combination into an ARFI or other mechanical push-compression elastographic system , or, under the supplementing argument that shear wave imaging to which genre the patent belongs was known to be practiceable with pushing techniques.

5) Apart from any obviousness double-patenting issues and assuming that applicants are claiming inter alia an elastographic type (imaging or non-image tissue characterizing) method and system and program code using parallel information gleaning techniques (specifically,1:many interpolation), then Konofagou et al is first applied in art combinations and under rejection logic which tracks the rejected claimed features.

Under a narrower interpretation of 'pushing' as originating in the ultrasound array proper, Walker is added in combination as an effecting mechanism for the Konofagou et al displacement step.

Thirdly, since the prior art (Torp et al, Lysansky et al, Geiman et al, Konofagou et al) on the one hand may be fairly said to have flirted with the parallel processing concept for elastographic characterization many times without a full commitment of an implementation description:

Torp et al (US6352507) – Cardiac strain imaging relevant under an art-recognized external/internal compression analogy (invoking K.'s incorporation by reference col. 6, lines 30-31 which makes available into the argument Ophir et al cols. 3-4 bridging with Torp et al providing direction to the cardiac self-compression) and with MLA or multi-line acquisition suggested col. 4 –5 bridging but then left standing in favor of interleaving.

Lysansky et al (US6221020) – MLA discussion with global applicability statement including general elasticity applicability non-specific as to compression type, cols. 6 lines 52 – 62 and col. 7 lines 6-16, in playback mode context..

Geiman et al (Phys. Med. Biol.45 (2000)) - statement of two advantages of parallel processing regarding bloodflow studies, pages 1542 – 1543 bridging, implementation of grid slope interpolation by simulation with parallel processing mode of the laboratory's scanner turned off and unmodelled, and acknowledging K et al on page 1541 item b)..

Konofagou et al (US6270459) in col. 5 providing acknowledgment of a Geiman et al ensemble tracking teaching with parallel processing, presumably akin to the above, but does not commit to an enactment.

it appears that parallel processing was 'always the bridesmaid but never the bride' for full implementation but on the other hand the aggregate import of these multiple suggestions must necessarily be that parallel processing in some form is readily wedded to compression elastography without hindsight coercion to the altar..

6) With respect claims 28, 47, 64-65, 75 and 82, or blood vessel evaluation structure, method and computer program product for 'mechanical property detection', when that terminology is broadly interpreted to include motion/ kinetics as a mechanical property of the heart then the claim's scope is viewed by the Examiner as extending 'beyond the beyonds' as the pastoral Irish would say, since conventional echocardiology as represented by Yamazaki et al readily analyses heart motion under activity stress as relates to healthy/ischemic structure in reference to the heart cycle salients.. When the scope is more narrowly construed to pertain to inter alia static and/or dynamic mechanical structural properties such as described on specification

pages 15 – 16 bridging and 18 – 19 bridging, then Varghese et al (potentially disputable 102(e) date) or Bonnefous '028 (indisputable 102(b) date) evidence that elastographic evaluation of mechanical structural properties of vasculature was known and conducted by comparative evaluations in relation to cardiac timing points and the relevant layer boundaries.

7) The argument regarding acoustic radiation force elastography with parallel processing, i.e. the art interpretation against narrowest scope as pertains to external /in vitro layer-based vascular characterization may reasonably be extended to the internal IVUS cardiac timed case.

Therefore patentability is presently opposed for all of the presented claims.

Lizzi et al (US6488626) is directed to acoustic radiation force – based tissue motion imaging.

Konofagou et al (US6494834) proposes intravascular strain imaging using a jitter-resistant power spectral centroid strain estimation.

Any inquiry concerning this communication should be directed to Jaworski Francis J. at telephone number 571-272-4738.

FJJ:fjj

05162006

Francis J. Jaworski
Primary Examiner